CLASS 588, HAZARDOUS OR TOXIC WASTE DESTRUCTION OR CONTAINMENT

SECTION I - CLASS DEFINITION

This is the generic class for (1) hazardous or toxic waste destruction by any means to include, heating, chemical action, or the interaction with any form of radiation; (2) permanent containment of hazardous or toxic waste by methods to include storage in a simple container, solidification, vitrification, cementation, and more elaborate methods of storage such as marine, tetonic, or extraterrestrial storage; (3) hazardous or toxic waste conversion by any means (e.g., chemical, physical, etc.) to an environmentally safe substance; and (4) preparation for destruction or containment as well as the actual destruction or containment.

(1) Note. Chemical substances that move through commerce and are used or treated in some useful application are not considered to be hazardous or toxic waste. These substances may be considered hazardous or toxic waste in the event they are introduced into the environment in a manner not consistent with their intended utility.

(2) Note. Waste proper for classification in Class 588 is considered to be too hazardous or toxic for placement in an ordinary municipal landfill.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

Line With Classes Producing Desired Useful Product

A process which produces a desired product for an end use, e.g., by manufacturing, chemical reaction, or purification etc., is classified with the product produced and controls over Class 588 regardless of whether or not a toxic or hazardous waste is destroyed or contained as part of the process. Class 588 provides for a process which destroys or contains hazardous or toxic waste and whose products are intended only to be safely discarded or whose production is only incidental to the destruction or containment.

Line With Method Classes

Class 588 controls over general method classes for storing or containing waste which is too hazardous or toxic to be placed in an ordinary municipal landfill.

Line With Apparatus Classes

This class does not provide for apparatus. Apparatus is classified based on its function without regard to whether or not hazardous or toxic waste is the substance acted on. Significant disclosure to processes of treating hazardous or toxic waste in apparatus patents may be cross-referenced to Class 588 as appropriate.

Line With Other Classes That Provide for Destroying Hazardous or Toxic Waste

Class 588 controls over general classes that are only incidental to the destruction or containment of hazardous or toxic waste.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, for separation of liquid hazardous or toxic waste from solids and the process of using gases or vapors to contact solids for the removal of hazardous or toxic waste.

48, Gas: Heating and Illuminating, for a process directed to the production of a combustible gas from hazardous or toxic waste (see Line With Classes Producing Desired Useful Product).

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, for a process which produces elemental metal as a desired product and which may also destroy hazardous or toxic waste, particularly subclasses 507 through 584 for the methods of adding hazardous or toxic waste to melting or molten iron and subclasses 585-706 for methods of adding hazardous or toxic waste to nonferrous metals at above 300°C (see Line With Classes Producing Desired Useful Product).

86, Ammunition and Explosive-Charge Making, subclass 50 for an apparatus for bomb disposal, or a method of bomb disposal by detonation (see Line With Apparatus Classes). This class, 588, takes the chemical destruction of bombs other than by detonation.

106, Compositions: Coating or Plastic, subclasses 600+ for the production of cement using hazardous or toxic waste (see Line With Classes Producing Desired Useful Product).

110, Furnaces, subclasses 235+ for apparatus which may be used for the incineration of hazardous or toxic waste (see Line With Apparatus Classes).

196, Mineral Oils: Apparatus, for apparatus that may be used in the treating of hazardous or toxic waste in mineral oils (see Line With Apparatus Classes).

201, Distillation: Processes, Thermolytic, for the use of thermolytic processes to destroy substances other than hazardous or toxic waste.

202, Distillation: Apparatus, for distillation apparatus which may be used in the treating of hazardous or toxic waste (see Line With Apparatus Classes).

203, Distillation: Processes, Separatory, for separating a liquid mixture with one or more of the components being hazardous or toxic waste, and subclasses 95+ for the additional use of water or steam in the separation.

204, Chemistry: Electrical and Wave Energy, for the interaction of electrical and wave energy with hazardous or toxic waste to produce a product (See Line With Classes Producing Desired Useful Product) and subclasses 193+ for electrical and wave energy apparatus used in the treatment of hazardous or toxic waste (see Line With Apparatus Classes).

208, Mineral Oils: Processes and Products, for the removal of hazardous or toxic substances form mineral oils, particularly subclasses 262.1+ for processes of removing halogen contaminants, e.g., PCB s from mineral oils (see Line With Classes Producing Desired Useful Product).

210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases, particularly subclasses 749+ for the use of chemical treatment; and subclasses 911+, an art collection, for the removal of cumulative poison from a liquid. The line between Class 210 and Class 588 is that, if there is a specific statement in the claim that hazardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is proper for Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, the process is proper for Class 210 (see Line With Classes Producing Desired Useful Product).

252, Compositions, subclasses 625+ for useful products (compositions) that contain radioactive hazardous or toxic waste (see Line With Classes Producing Desired Useful Product).

261, Gas and Liquid Contact Apparatus, for apparatus which may be used in the treatment of gas or liquid hazardous or toxic waste (see Line With Apparatus Classes).

266, Metallurgical Apparatus, for means of treating hazardous or toxic substances produced during the operation of a metallurgical apparatus, particularly subclasses 144+ for treating gaseous substances and 200+ for treating liquefied substances (see Line With Apparatus Classes).

373, Industrial Electrical Heating Furnaces, for electric heating furnaces that may be used in the treatment of hazardous or toxic waste (see Line With Apparatus Classes).

405, Hydraulic and Earth Engineering, subclasses 128.1 through 128.9 for soil remediation involving hazardous or toxic substances, and subclasses 129.1-129.95 for the deposition of waste, which is not hazardous or toxic, in an earth formation or the confinement of such waste in a structure in the earth.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for apparatus acting on hazardous or toxic waste for disinfection or sterilization thereof (see Line With Apparatus Classes). Class 422 provides for processes of destruction of hazardous or toxic material, such as noxious micro-organisms, by disinfecting or sterilizing when a desired useful product or article results (i.e., not a waste), and not elsewhere provided for (see Line With Classes Producing Desired Useful Product). Class 422, subclasses 1+ provides for processes of sterilizing wastes (such as household garbage or waste) not considered hazardous or toxic for Class 588.

423, Chemistry of Inorganic Compounds, subclasses 210 through 215.5 for chemically removing, modifying or destroying a hazardous or toxic component of normally gaseous mixture, except for the chemical destruction of chemical weapons which may gas, which is in this Class 588 (see Line With Other Classes That Provide for Destroying Hazardous or Toxic Waste); and for recovering inorganic elements or compounds from hazardous or toxic waste (See Line With Classes Producing Desired Useful Product).

431, Combustion, for combustion processes for purposes other than to destroy hazardous or toxic waste.

435, Chemistry: Molecular Biology and Microbiology, for the methods of making micro-organisms, per se, and subclass 262.5 for methods of using the micro-organisms to destroy hazardous or toxic waste (see Line With Other Classes That Provide for Destroying Hazardous or Toxic Waste).

532, Organic Compounds, for the production of useful products from hazardous or toxic waste (see Line With Classes Producing Desired Useful Product).

976, Nuclear Technology, for the methods and apparatus used in the production of nuclear fuel, manufacturing of nuclear reactors, and nuclear technology in general (see Line With Apparatus Classes and Line With Classes Producing Desired Useful Product).

SECTION IV - GLOSSARY

Terms used throughout the schedule and definitions are to have the meaning ascribed below. Generally accepted or commonly used "art" terms retain their meaning found in their everyday usage and are not found in this glossary. Certain specialized terms are employed in these subclasses and they have been given definitions altered to meet the needs of this class. Some or all of the terms may be broader or more restricted as well as different in meaning compared to normal usage.

ALKALI METALS

The metal elements in group I of the periodic system consisting of Li, Na, K, Rb, and Cs.

ALKALINE EARTH METALS

The metal elements in group II of the periodic system consisting of Mg, Ca, Sr, and Ba.

CATALYST

A substance which either increases or decreases the speed of a chemical reaction.

CHALCOGEN

Also known as chalcogenides, specifically O, S, Se, or Te.

COMPOSITION

A mixture of material(s) such as elements, compounds, etc. which materials are not present in a ratio of small whole numbers based on molar ratios, i.e., mixtures.

COMPOUND

A substance whose molecules consist of unlike atoms, whose constituents cannot be separated by physical means, whose properties are entirely different from those of its constituent elements, and which contains definite proportions of its constituent elements, depending on their atomic weights.

CONTAINMENT

To hold or enclose totally to prevent any leaching or leaking of the hazardous or toxic material into the environment, and any use of a container that is destroyed with the waste.

CONTAMINATE

To make a first substance impure (hazardous or toxic) by contact with or by the addition of a second or more substances.

DESTROYING

To convert the hazardous or toxic waste to an environmentally safe substance to include the steps used to prepare the waste for destruction as well as the actual destruction.

ENCAPSULATING

To immobilize hazardous or toxic waste materials by any means to include vitrification, combining with organoclay and mixing, adding a cement material, or enclosing in a container the hazardous or toxic waste material. The hazardous or toxic waste material is held in place and is not permitted to be leached or leaked out into the environment.

ENVIRONMENTALLY SAFE SUBSTANCE

Is any material that in any of its chemical or physical interactions with the environment results in no measurable adverse effects or degradations on the environment.

HALOGENS

The elements (F, Cl,Br, I, or At).

HARMFUL CHEMICAL SUBSTANCE

Harmful chemical substances are chemical waste substances which are too hazardous or toxic to be discarded in an ordinary municipal landfill.

HAZARDOUS WASTE

Materials that when present in the environment produce for man and other living organisms an acute and/or cumulative effect that is a dangerous, risky, or perilous environmental situation in so far as the physiological well being of the organism is concerned (e.g., caustic chemicals, irritants, cancer causing agents, and other tumor producing materials).

HEAVY METAL

A metal other than the following (light) metals, lithium (Li), sodium (Na), Potassium (K), Rubidium (Rb), Cesium (Cs), Francium (Fr), Calcium (Ca), Strontium (Sr), Barium (Ba), Beryllium (Be), Magnesium (Mg), and Aluminum (Al).

IMMOBILIZE

To contain the hazardous or toxic waste by any means that keeps the hazardous or toxic waste in a matrix or container such as cement, organoclay, glass, or in an actual physical container.

NOBLE GASES

The elements of the periodic table that consist of He, Ar, Kr, Xe, and Rn which have no valency and combine only with great difficulty, if at all, with other elements.

INCINERATE

To burn to highly oxidized ashes. The oxidation is chemically near completion.

LEACHING

The processes of extracting or dissolving a soluble component from a mixture by contacting the mixture with a solvent, resulting in dissolution or solution of the solubles and leaving an insoluble material.

Note. Solution of a substance in a normally solid, molten material is not considered to be leaching as defined above.

ORGANIC COMPOUND

A compound as defined in the definition of Class 260, Chemistry of Carbon Compounds as qualified by (34) Note.

ORGANIC METAL CONTAINING COMPOUND

Any carbon containing compound as defined by the definition of Class 260, in which the carbon compound contains a metal.

RADIOACTIVE

Any element capable of giving off rays or subatomic particles by spontaneous disintegration. The radioactive elements are usually those having an atomic number of 84 or greater and the phenomenon of radioactivity is not affected by chemical or physical influences or matter adulterated by radioactivity.

RARE EARTHS

The compounds of the elements found on the periodic chart at atomic numbers 21, 39, or 57-71 inclusive.

SORPTION

The ability of a substance to undergo a surface reaction that causes that substance to be able to retain other substances, these other substances are generally gases, liquids, or dissolved materials.

SLUDGE

Residue (usually viscous) from an industrial, home, or agricultural process which may contain a harmful chemical substance. Examples of harmful chemical substances are: heavy metals, sulfur compounds, phosphorus compounds, nitrogen compounds, and halogenated compounds any of which may be organic.

TOXIC WASTE

Materials that are direct physiological poisons to living organisms (e.g., pesticides, heavy metal ion solutions, and other organic and inorganic materials) that are poisonous to life.

VOLATILIZING

Converting a normally solid or liquid material into a gas or vapor state; mere evaporation of water or other solvents is included under this definition.

SUBCLASSES

1 **DESTRUCTION OR CONTAINMENT OF RADIOACTIVE WASTE:**
This subclass is indented under the class definition. Product and process wherein radioactive material that is intended to be disposed of is transformed to a condition facilitating its destruction or disposal or contained so as to hold or enclose totally to prevent any leaching or leaking of radioactivity into the environment.

2 **By fixation in stable solid media:**
This subclass is indented under subclass 1. Subject matter wherein the radioactive material is immobilized in a solid medium.

(1) Note. Immobilization is on either a molecular or particulate level, the radioactive material permeating or being part of the whole mass.

3 **Cement, concrete, or hydraulic setting:**
This subclass is indented under subclass 2. Subject matter wherein the solid media is concrete, cement containing, or hydraulic setting composition.

4 **With additional solid material to enhance fixation of radioactivity:**
This subclass is indented under subclass 3. Subject matter wherein the concrete, cement containing, or hydraulically settable composition contains an additional solid material that enhances retention of the radioactive material to leaking or leaching.

(1) Note. The additional solid does not participate or influence the hydraulically settable nature of the solid media.

5 **Bituminous:**
This subclass is indented under subclass 2. Subject matter wherein the solid media is butimen, asphalt, or tarlike.

6 **Resin or polymer; e. g., cellulose, polyethylene:**
This subclass is indented under subclass 2. Subject matter wherein the solid media is a natural or synthetic resin or a polymer.

7 **Ion exchange resin:**
This subclass is indented under subclass 6. Subject matter wherein the solid media is a solid resin material with chemically bound ionic groups capable of exchanging ion with radioactive contaminant ionic groups.

8 **Polymer derived from ethylenically unsaturated monomer:**
This subclass is indented under subclass 6. Subject matter wherein the polymer is derived only from ethylenically unsaturated monomer(s); i.e., wherein the monomer contains a c=c which undergoes addition polymerization to form long c-c chains.

9 **Clay or clay-like:**
This subclass is indented under subclass 2. Subject matter wherein the solid media is a fine grained naturally occurring earthy material or artificial composition having generally, equivalent chemical and physical properties.

10 **Ceramic or ceramic-like:**
This subclass is indented under subclass 2. Subject matter wherein the solid media is an inorganic composition that is to be hardened by heat treatment or which has been so hardened.

11 **Glass, glass-like, or vitreous:**
This subclass is indented under subclass 10. Subject matter wherein the ceramic is a glassy or vitrified media.

12 **Boron containing:**
This subclass is indented under subclass 11. Subject matter wherein the glassy or vitreous media contains boron.

13 **Ion exchange material:**
This subclass is indented under subclass 2. Subject matter wherein the solid media is a nonresinous material having the ability or property, of adsorbing or exchanging cations and/or anions with the radioactive material.

14 **Silicon containing:**
This subclass is indented under subclass 2. Subject matter wherein the solid media contains silicon.

15 Metal containing:
This subclass is indented under subclass 2. Subject matter wherein the solid media contains free metal or combined metal and includes alleys and metal compounds.

(1) Note. Rock and synthetic rock are included in this subclass because of their mixed metal oxide composition.

SEE OR SEARCH THIS CLASS, SUBCLASS:
10, for similar compositions hardened by heat.

16 Surrounding with specified material or structure:
This subclass is indented under subclass 1. Subject matter wherein the containment surrounding the radioactive material is defined by its structure or by the material forming the containment or container means.

17 Geological:
This subclass is indented under subclass 1. Subject matter wherein the radioactive material containment is accomplished by placing it in the ground, bore hole, underwater, or space or orbit.

18 Chemical conversion to a table solid:
This subclass is indented under subclass 1. Subject matter wherein the radioactive material as it occurs in the waste is chemically converted to a solid that is more readily disposable; e.g., precipitation as an insoluble solid.

19 Incineration, calcination, pyrolyzing to obtain solid residue:
This subclass is indented under subclass 18. Subject matter wherein the radioactive material is burned, calcined, or pyrolyzed to a solid residue to facilitate disposal.

20 Treating radioactive liquid:
This subclass is indented under subclass 1. Subject matter wherein liquid, flowable radioactive waste material is placed in better condition for disposal.

(1) Note. This subclass includes treatment or slurries or solids suspended in a liquid.

SEE OR SEARCH CLASS:
159, Concentrating Evaporators, for processes of concentrating solids held in solution or suspension by evaporation of the liquid containing the solids and isolation of the concentrate obtained.

249 CONTAINMENT:
This subclass is indented under the class definition. Processes wherein the hazardous or toxic waste is confined in a permanent facility by means such that the waste is not permitted to move or migrate from the permanent facility. Additionally, the hazardous or toxic waste can be contained in a monolithic type structure.

(1) Note. The containment also includes the processes of producing monoliths which when stored in (moved to) a facility are themselves nonleaching and in no way enter or contaminate the facility environment or the outside environment.

SEE OR SEARCH CLASS:
53, Package Making, appropriate subclasses for methods or apparatus used in package making to contain hazardous or toxic waste, and for methods of packaging to move hazardous or toxic materials through commerce where the materials are removed from the container for subsequent use or treatment.
206, Special Receptacle or Package, subclasses 528+ for ampule, capsule, pellet, or granule containing hazardous or toxic waste.
220, Receptacles, subclasses 62.11+ for multilayer barrier structure intended to contain hazardous or toxic waste.
428, Stock Material or Miscellaneous Articles, subclass 2 for compacted trash or refuse bundle which may include hazardous or toxic waste and subclasses 443+ for asbestos containing articles.

249.5 Chemical or germ warfare agents, or pathogenic organisms (e.g., sarin, VX, anthrax, virus, bacteria and medical waste):
This subclass is indented under subclass 249. Processes wherein a material intended to be employed as a chemical or germ warfare agent,

or a disease causing organism, is the hazardous or toxic substance which is contained.

(1) Note. This subclass includes the containment of nerve gases, mustard agents and micro-organisms intended to be used in warfare.

SEE OR SEARCH THIS CLASS, SUBCLASS:

300 through 320, for the use of a chemical process to stabilize a substance which is subject to containment, or to destroy a chemical or germ warfare agent.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, subclasses 749+ for a chemical treatment process to purify a liquid to obtain a desired product, e.g., water.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 1 through 43 for methods using disinfecting or sterilizing to destroy micro-organisms other than germ warfare agents.

435, Chemistry: Molecular Biology and Microbiology, subclasses 235.1 through 239 for virus, bacteriophage, composition thereof, preparation or purification thereof, or production of viral subunits.

250 Geologic marine or extraterrestrial storage and containment (e.g., tetonic, volcanic, deep natural, manmade earth cavity, submarine placement sites, lunar, earth orbital, and solar placement):

This subclass is indented under subclass 249. Process wherein the storage or containment of the hazardous or toxic waste is accomplished by the following methods, e.g., descending tetonic plates, active volcanoes, caves, salt caverns, bore holes, abandoned mines, submarine dumping, earth orbital storage, lunar storage, and the use of decaying solar orbits to require the waste to fall into the sun.

SEE OR SEARCH CLASS:

405, Hydraulic and Earth Engineering, subclasses 129.1 through 129.95 for the deposition of waste, which is not hazardous or toxic, in an earth formation or the confinement of such waste in a structure in the earth.

251 Treating a solid (e.g., clay, slag, spent sorbent, active carbon, etc.) to prevent gas emissions:

This subclass is indented under subclass 249. Processes wherein solids are treated to prevent the emissions of hazardous or toxic gas.

(1) Note. Included herein is the treatment of slag heaps to prevent the emissions of hazardous or toxic gas.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclasses 19+ for the utilization of slag.

106, Compositions: Coating or Plastic, subclasses 624+, 714+, and 789+ for utilization of slag in plastic compositions.

501, Compositions: Ceramic, subclasses 28 and 36 for ceramic compositions using slag.

252 Solidification, vitrification, or cementation:

This subclass is indented under subclass 249. Processes wherein containment is accomplished by the use of solidification, vitrification, or cementation as a means of immobilizing hazardous or toxic waste.

(1) Note. Solidification included herein is any process that will produce a solid phase nonleachable product.

(2) Note. Vitrification included herein is any process that will produce a solid phase nonleachable glass like noncrystalline product.

(3) Note. Cementation included herein is any process that will produce a solid phase nonleachable hydraulic setting product.

SEE OR SEARCH THIS CLASS, SUBCLASS:

312 through 320, for the use of a chemical reaction to stabilize a substance which is subject to solidification, vitrification or cementation.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, appropriate subclasses for the methods of producing glass.

106, Compositions: Coating or Plastic, subclasses 600+ for alkali metal silicate containing compositions and subclasses 638+ for inorganic settable ingredient containing compositions.

210, Liquid Purification or Separation, subclasses 749+ for a chemical treatment process.

501, Compositions: Ceramic, subclasses 2+ for devitrified glass - ceramics, subclasses 11+ for glass compositions, and subclass 124 for refractory hydraulic cement containing compositions.

253 In situ vitrification:

This subclass is indented under subclass 252. Processes whereby the melting or sintering to form a glass or glass like substance is done underground.

(1) Note. Included herein is any process that produces the necessary conditions for the melting or sintering of a substance to form a glassy mass under the surface of the earth.

SEE OR SEARCH CLASS:

405, Hydraulic and Earth Engineering, subclass 128.1 for a process or apparatus for soil remediation wherein the process does not destroy or contain hazardous or toxic waste; and subclass 258.1 for the treatment of a condition of the earth not related to remediation, or for the control of an earthen formation for the purpose of reinforcement or stabilization.

254 Contains asbestos:

This subclass is indented under subclass 252. Processes wherein asbestos is present in the hazardous or toxic material.

SEE OR SEARCH CLASS:

106, Compositions: Coating or Plastic, subclasses 600+ for compositions containing asbestos.

162, Paper Making and Fiber Liberation, subclasses 153+ for making a paper like product containing asbestos.

423, Chemistry of Inorganic Compounds, subclass 167 for treating asbestos.

255 Polymer or resin containing (e.g., foam, etc.):

This subclass is indented under subclass 252. Processes wherein a polymer or resin is used in the solidification, vitrification, or cementation.

SEE OR SEARCH CLASS:

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 4+ for encapsulating normally liquid materials.

427, Coating Processes, subclasses 212+ for particles, flakes, or granules coated or encapsulated.

256 Waste contains heavy metals (e.g., fly ash, flue dust, and incinerator ash):

This subclass is indented under subclass 252. Processes wherein hazardous or toxic waste contains heavy metals.

(1) Note. It is assumed that fly ash, flue dust, and incinerator ash obtained from various sources will contain at least traces of some heavy metal in the absence of disclosure to the contrary.

SEE OR SEARCH CLASS:

106, Compositions: Coating or Plastic, subclasses 286.1+ for inorganic materials only containing at least one metal atom and subclass 287.18 for coating or plastic compositions containing heavy metals.

501, Compositions: Ceramic, subclass 155 for ceramic compositions composed of waste material.

257 And confined in a cement type material (e.g., concrete):

This subclass is indented under subclass 256. Processes wherein waste is used in the production or formulation of a cement type product.

SEE OR SEARCH CLASS:

106, Compositions: Coating or Plastic, subclasses 600+ for alkali metal silicate containing subclasses 638+ for

inorganic settable ingredient containing, and subclasses 286.1+ for compositions, coating or plastic which contain only inorganic materials with at least one metal atom. Class 588 contains any formulation of the above materials with hazardous or toxic waste.

405, Hydraulic and Earth Engineering, subclasses 266+ for cementitious grouting.

258 Storage to contain pathogenic organisms (e.g., virus, bacteria, and medical waste):
This subclass is indented under subclass 249. Processes wherein the hazardous or toxic waste contains pathogenic organisms.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, subclasses 749+ for a chemical treatment process.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 1+ for disinfecting or sterilizing.

435, Chemistry: Molecular Biology and Microbiology, subclasses 235.1+ for virus, bacteriophage, composition thereof, preparation or purification thereof producing viral units.

259 Secondary containment:
This subclass is indented under subclass 249. Processes wherein more than one form of containment is used (i.e., one form of containment around another form of containment).

SEE OR SEARCH CLASS:

405, Hydraulic and Earth Engineering, subclass 129.1 for subterranean waste disposal, containment, or treatment; and subclass 266 for cementing.

260 With sensing, detecting, or monitoring:
This subclass is indented under subclass 249. Processes wherein the integrity of the containment is observed by chemical, physical, electrical, or optical methods to sense, detect, or monitor movement of waste.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 40+ and 52 for leakage testing and subclasses 290+ for barrel liquid level indicator.

340, Communications: Electrical, subclasses 3.1 through 3.9 for selective communication having monitoring in addition to control.

261 MISCELLANEOUS:
This subclass is indented under the class definition. Process not provided for above.

299 GERM WARFARE AGENTS DESTROYED:
This subclass is indented under the class definition. Process wherein a material, e.g. micro-organism, intended to be employed as a germ warfare agent is the hazardous or toxic substance destroyed or converted.

(1) Note. This subclass includes the destruction of micro-organisms intended to be used in warfare.

SEE OR SEARCH THIS CLASS, SUBCLASS:

249.5, for processes of storage or containment of chemical or germ warfare agents.

SEE OR SEARCH CLASS:

110, Furnaces, for apparatus which may be used to destroy hazardous or toxic waste.

201, Distillation: Processes, Thermolytic, for the use of thermolytic processes to destroy substances other than hazardous or toxic waste.

261, Gas and Liquid Contact Apparatus, for apparatus which may be used in the treatment of gas or liquid hazardous or toxic waste.

266, Metallurgical Apparatus, for metallurgical apparatus which could be used to destroy hazardous or toxic waste, particularly subclasses 144+ for treating gaseous substances and 200+ for treating liquefied substances.

373, Industrial Electrical Heating Furnaces, for electric heating furnaces that may be used to destroy hazardous or toxic waste.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for the methods and apparatus used in destroying micro-organisms other than germ warfare agents.

431, Combustion, for combustion processes for purposes other than to destroy hazardous or toxic waste.

435, Chemistry: Molecular Biology and Microbiology, subclass 262.5 for methods of using the micro-organisms to destroy hazardous or toxic waste.

300 PROCESSES FOR MAKING HARMFUL CHEMICAL SUBSTANCES HARMLESS, OR LESS HARMFUL, BY EFFECTING A CHEMICAL CHANGE IN THE SUBSTANCES (EPO/JPO):

This subclass is indented under the class definition. Processes for chemically changing harmful chemical substances into substances which are harmless or less harmful. These processes are chemical processes which change the chemical composition of the harmful chemical substance. The harmful chemical substance can be one component of a mixture. The use of special chemical reagents for chemical fixing is included. These processes can comprise the step of dissolving or dispersing the harmful chemical substances in water for the purpose of treating them, or the step of producing a gaseous product from a non-gaseous harmful chemical substance.

(1) Note. When classifying in subclasses 300-321, classification is normally also made in subclasses 400-415 to identify the hazardous substance.

(2) Note. Harmful chemical substances are chemical waste substances which are too hazardous or toxic to be discarded in an ordinary municipal landfill.

(3) Note. The production or recovery of marketable products is covered elsewhere, as indicated by the references below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

299, for the destruction of germ warfare agents.

SEE OR SEARCH CLASS:

48, Gas: Heating and Illuminating, for a process directed to the production of a combustible gas from hazardous or toxic waste.

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, for processes of preparing or treating elemental metal employing hazardous or toxic waste as a raw material or agent, particularly subclasses 507+ for the methods of adding hazardous or toxic waste to melting or molten iron and subclasses 585+ for methods of adding hazardous or toxic waste to nonferrous metals at above 300°C.

86, Ammunition and Explosive-Charge Making, subclass 50 for an apparatus for bomb disposal, or a method of bomb disposal by detonation. This class, 588, takes the chemical destruction of bombs other than by detonation.

106, Compositions: Coating or Plastic, subclasses 600+ for the production of cement using hazardous or toxic waste.

110, Furnaces, subclasses 235+ for apparatus which may be used for the incineration of hazardous or toxic waste.

201, Distillation: Processes, Thermolytic, for the use of thermolytic processes to destroy substances other than hazardous or toxic waste.

203, Distillation: Processes, Separatory, for separating a liquid mixture with one or more of the components being hazardous or toxic waste, and subclasses 95+ for the additional use of water or steam in the separation.

204, Chemistry: Electrical and Wave Energy, for the interaction of electrical and wave energy with hazardous

or toxic waste to produce a product, and subclasses 193+ for electrical and wave energy apparatus used in the treatment of hazardous or toxic waste.

208, Mineral Oils: Processes and Products, for the removal of hazardous or toxic substances form mineral oils, particularly subclasses 262.1+ for processes of removing halogen contaminants, e.g., PCB"s from mineral oils.

210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases, particularly subclasses 749+ for the use of chemical treatment; and subclasses 911+, an art collection, for the removal of cumulative poison from a liquid. The line between Class 210 and Class 588 is that, if there is a specific statement in the claimed disclosure that hazardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is proper for Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, the process is proper for Class 210.

261, Gas and Liquid Contact Apparatus, for apparatus which may be used in the treatment of gas or liquid hazardous or toxic waste.

266, Metallurgical Apparatus, for means of treating hazardous or toxic substances produced during the operation of a metallurgical apparatus, particularly subclasses 144+ for treating gaseous substances and 200+ for treating liquefied substances.

373, Industrial Electrical Heating Furnaces, for electric heating furnaces used in the treatment of hazardous or toxic waste.

405, Hydraulic and Earth Engineering, subclasses 128.1 through 128.9 for soil remediation involving hazardous or toxic substance.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for apparatus using disinfection or sterilization to destroy micro-organisms, and for methods using disinfection or sterilization to destroy micro-organisms other than germ warfare agents.

423, Chemistry of Inorganic Compounds, subclasses 210 through 215.5 for chemically removing, modifying or destroying a hazardous or toxic component of normally gaseous mixture (except for the chemical destruction of chemical weapons which may gas, which is in this Class 588); and for recovering inorganic elements or compounds from hazardous or toxic waste.

431, Combustion, for combustion processes for purposes other than to destroy hazardous or toxic waste.

435, Chemistry: Molecular Biology and Microbiology, for processes whereby a micro-organism is used in degradation of hazardous or toxic waste, e.g., degrading PCBs.

532, Organic Compounds, for the production of useful products from hazardous or toxic waste.

301 By subjecting to electric or wave energy or particle or ionizing radiation (EPO/JPO):

This subclass is indented under subclass 300.

Subject matter wherein electric or wave energy or particle or ionizing radiation is used to chemically change the harmful chemical substance.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G) and FI (A62D 3/00 100).

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclasses 12+ for combined operations including the use of magnetic operations; subclasses 509+ for sorting special items, and certain methods and apparatus some of which use magnetic properties and note subclasses 212 through 232 for magnetic separation, per se. (Class 588 provides for the magnetic separation of any hazardous or toxic waste in combination with the destruction of the waste).

302 Electrochemical processes, e.g., electrodialysis (EPO/JPO):
This subclass is indented under subclass 301.
Subject matter wherein an electrochemical process is used to chemically change the harmful chemical substance.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G2) and FI (A62D 3/00 110).

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, for processes of electrodialysis or electrolysis.
210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases. The line between Class 210 and Class 588 is that, if there is a specific statement in the claim that hazardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is placed in Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, place the process in Class 210.

303 Electrolytic degradation or conversion (EPO/JPO):
This subclass is indented under subclass 302.
Subject matter wherein electrolysis is used to chemically change the harmful chemical substance.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G2B) and FI (A62D 3/00 111).

304 Sonic energy (EPO/JPO):
This subclass is indented under subclass 301.
Subject matter wherein energy in sound waves is used to chemically change the harmful chemical substance.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G4) and FI (A62D 3/00 120).

305 Particle radiation, e.g., electron beam radiation (EPO/JPO):
This subclass is indented under subclass 301.
Subject matter wherein particle radiation is used to chemically change the harmful chemical substance. Particles include molecules, atoms, protons or electrons.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G6) and FI (A62D 3/00 130).

306 Electromagnetic radiation, e.g., laser (EPO/JPO):
This subclass is indented under subclass 301.
Subject matter wherein electromagnetic radiation is used to chemically change the harmful chemical substance.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G8) and FI (A62D 3/00 140).

307 Gamma rays (about 0.003nm-0.03nm) (EPO/JPO):
This subclass is indented under subclass 306.
Subject matter wherein the wavelengths range from 0.003nm– 0.03nm.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G8B) and FI (A62D 3/00 141).

308 X – Rays (about 0.03nm-3nm) (EPO/JPO):
This subclass is indented under subclass 306.
Subject matter wherein the wavelengths range from 0.03nm– 3nm.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G8D) and FI (A62D 3/00 142).

309 Ultraviolet radiations (about 3nm-400nm) (EPO/JPO):
This subclass is indented under subclass 306.
Subject matter wherein the wavelengths range from 3nm– 400nm.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G8F) and FI (A62D 3/00 143).

310 Microwave radiations (about 0.3cm-30cm) (EPO/JPO):

This subclass is indented under subclass 306. Subject matter wherein the wavelengths range from 0.3cm– 30cm.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G8H) and FI (A62D 3/00 144).

311 Plasma (EPO/JPO):

This subclass is indented under subclass 301. Subject matter wherein plasma is used to chemically change the harmful chemical substance.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00G10) and FI (A62D 3/00 150).

312 By hydropyrolysis or destructive steam gasification, e.g., using water and heat or supercritical water, to effect chemical change (EPO/JPO):

This subclass is indented under subclass 300. Subject matter wherein water or steam is used in a thermal process to achieve chemical change.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00J) and FI (A62D 3/00 200).

SEE OR SEARCH CLASS:

48, Gas: Heating and Illuminating, subclasses 197+ for processes of gasification to produce a heating or illuminating gas.

201, Distillation: Processes, Thermolytic, subclasses 32+ for the addition of disparate gaseous material to a carbonizing zone.

202, Distillation: Apparatus, subclasses 96+ for thermolytic type apparatus.

203, Distillation: Processes, Separatory, subclasses 28+ for the processes with a chemical reaction and subclasses 95+ for the addition of water or steam.

431, Combustion, subclass 4 for feeding a flame modifying additive and subclass 5 for burning waste gas.

313 By reacting with chemical agents (EPO/JPO):

This subclass is indented under subclass 300. Subject matter wherein an additional chemical material is used to react with the harmful chemical substance.

(1) Note. The substance that is destroyed maybe a mixture of hazardous or toxic waste with nonhazardous or nontoxic waste. Either component of the mixture being destroyed is sufficient for classification here. Mandatory XR (cross-reference) into subclass(es) for the actual hazardous or toxic substance (component) destroyed is noted.

(2) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00K) and FI (A62D 3/00 300).

SEE OR SEARCH THIS CLASS, SUBCLASS:

252 through 257, for the containment of hazardous substances through solidification, vitrification or cementation

532, through 570, for the production of useful organic compounds from hazardous or toxic substances.

SEE OR SEARCH CLASS:

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, for a process which produces elemental metal as a desired product and which may also destroy hazardous or toxic waste, particularly subclasses 507+ for the methods of adding hazardous or toxic waste to melting or molten iron and subclasses 585+ for methods adding hazardous or toxic waste to nonferrous metals at above 300°C.

86, Ammunition and Explosive-Charge Making, subclass 50 for an apparatus for bomb disposal, or a method of bomb disposal by detonation. This class, 588, takes the chemical destruction of bombs other than by detonation.

106, Compositions: Coating or Plastic, subclasses 600+ for the production of cement using hazardous or toxic waste.

110, Furnaces, subclasses 235+ for apparatus which may be used for the incineration of hazardous or toxic waste.

201, Distillation: Processes, Thermolytic, for thermolytic distillation processes in general.

202, Distillation: Apparatus, for distillation apparatus which may be used in the treating of hazardous or toxic waste.

203, Distillation: Processes, Separatory, for separating a liquid mixture with one or more component being hazardous or toxic waste, and subclasses 95+ for the additional use of water or steam in the separation.

204, Chemistry: Electrical and Wave Energy, for the interaction of electrical and wave energy with hazardous or toxic waste to produce a product, and subclasses 193+ for electrical and wave energy apparatus used in the treatment of hazardous or toxic waste.

208, Mineral Oils: Processes and Products, subclasses 208+ for sulfur removal from mineral oils.

210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases, particularly subclasses 749+ for the use of chemical treatment; and subclasses 911+, an art collection, for the removal of cumulative poison from a liquid. The line between Class 210 and Class 588 is that, if there is a specific statement in the claim that hazardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is proper for Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, the process is proper for Class 210.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for apparatus acting on hazardous or toxic waste for disinfection or sterilization thereof. Class 422 provides for processes of destruction of hazardous or toxic material, such as noxious micro-organisms, by disinfecting or sterilizing when a desired useful product or article results (i.e., not a waste), and not elsewhere provided for. Class 422, subclasses 1+ provides for processes of sterilizing wastes (such as household garbage or waste) not considered hazardous or toxic for Class 588.

423, Chemistry of Inorganic Compounds, for the production of a desired inorganic substance or product for a hazardous or toxic substance.

585, Chemistry of Hydrocarbon Compounds, for processes employing chalcogen (O, S, Se, or Te) containing compounds in the manufacture of hydrocarbons containing the chalcogen. subclasses 240+ for the production of a hydrocarbon mixture from refuse or vegetation.

314 By treatment in molten chemical reagent, e.g., salts or metals (EPO/JPO):

This subclass is indented under subclass 313. Process wherein the reaction takes place in a chemical reagent which is normally solid at room temperature is used in a molten state.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00K2) and FI (A62D 3/00 310).

SEE OR SEARCH CLASS:

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, for a process which produces elemental metal as a desired product and which may also destroy hazardous or toxic waste, particularly subclasses 507+ for the methods of adding hazardous or toxic waste to melting or molten iron and subclasses 585+ for methods of adding hazard-

ous or toxic waste to nonferrous metals at above 300°C.

110, Furnaces, subclasses 235+ for apparatus which may be used for the incineration of hazardous or toxic waste.

201, Distillation: Processes, Thermolytic, subclass 11 for the use of liquid metal in a thermolytic distillation for purposes other than the destruction of hazardous or toxic waste.

266, Metallurgical Apparatus, for means of treating hazardous or toxic substances produced during the operation of a metallurgical apparatus, particularly subclasses 144+ for treating gaseous substances and 200+ for treating liquefied substances.

423, Chemistry of Inorganic Compounds, digest 12 for the use of molten media in chemical reactions.

431, Combustion, for processes of combustion in general, and for the combustion of hazardous or toxic waste which produces a useful product.

315 By chemical fixing the harmful substance, e.g., by chelation or complexation (EPO/JPO):

This subclass is indented under subclass 313. Process wherein the reaction results in a chemical fixing of the harmful chemical substance.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00K4) and FI (A62D 3/00 320).

316 Dehalogenation using reactive chemical agents able to degrade (dehalogenation in molten chemical reagent 314) (EPO/JPO):

This subclass is indented under subclass 313. Process wherein halogen is removed from the harmful chemical substance by using reactive chemical agents.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00K6) and FI (A62D 3/00 330).

SEE OR SEARCH THIS CLASS, SUBCLASS:

314, for dehalogenation in molten chemical reagent.

317 By hydrolysis (EPO/JPO):

This subclass is indented under subclass 313. Subject matter wherein water is used to chemically change the harmful chemical substance.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00K8) and FI (A62D 3/00 340).

318 Detoxification by using acid or alkaline reagents (EPO/JPO):

This subclass is indented under subclass 313. Subject matter wherein an acid or a base is used to chemically change the harmful chemical substance.

(1) Note. The added material may be, for example, acids, bases, or hydrogen.

(2) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00K10) and FI (A62D 3/00 350).

319 By reduction, e.g., hydrogenation (EPO/JPO):

This subclass is indented under subclass 313. Subject matter wherein the chemical reaction is reductive, i.e. gain of electrons.

(1) Note. The added material may be, for example, acids, bases, or hydrogen.

(2) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00K12) and FI (A62D 3/00 360).

320 By oxidation; by combustion (EPO/JPO):

This subclass is indented under subclass 313. Subject matter wherein the chemical reaction is oxidative, i.e. loss of electrons.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00K14) and FI (A62D 3/00 370).

SEE OR SEARCH CLASS:

110, Furnaces, subclass 237 for incinerators intended for use with explosive material.

321 By heating to effect chemical change, e.g., pyrolysis (EPO/JPO):
This subclass is indented under subclass 300. Subject matter wherein thermal degradation is used to decompose the harmful chemical substance.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00L) and FI (A62D 3/00 400).

SEE OR SEARCH CLASS:
201, Distillation: Processes, Thermolytic, for thermolytic distillation processes in general.

400 Harmful chemical substances made harmless, or less harmful, by effecting chemical change (EPO/JPO):
This subclass is indented under subclass 300. Subject matter wherein the harmful chemical substance is identified.

(1) Note. When classifying into subclasses 401-404, classification is also made in subclasses 405-415 according to the specific substance, if of interest.

(2) Harmful chemical substances are chemical waste substances which are too hazardous or toxic to be discarded in an ordinary municipal landfill.

(3) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M) and FI (A62D 3/00 600).

SEE OR SEARCH CLASS:
75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, for a process which produces elemental metal as a desired product and which may also destroy hazardous or toxic waste, particularly subclasses 507+ for the methods of adding hazardous or toxic waste to melting or molten iron and subclasses 585+ for methods of adding hazardous or toxic waste to nonferrous metals at above 300°C.
86, Ammunition and Explosive-Charge Making, subclass 50 for an apparatus for bomb disposal, or a method of bomb disposal by detonation. This class, 588, takes the chemical destruction of bombs other than by detonation.
106, Compositions: Coating or Plastic, subclasses 600+ for the production of cement using hazardous or toxic waste.

401 Chemical warfare substances, e.g., cholinesterase inhibitor (EPO/JPO):
This subclass is indented under subclass 400. Subject matter wherein the hazardous or toxic substance is intended to incapacitate or destroy a human enemy. Chemical warfare substances include nerve, blister/vesicant, blood and pulmonary affecting substances.

(1) Note. This subclass includes the destruction of nerve gases and mustard agents.

(2) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M2) and FI (A62D 3/00 610).

SEE OR SEARCH CLASS:
423, Chemistry of Inorganic Compounds, for recovering inorganic elements or compounds from hazardous or toxic waste, and subclasses 210 through 215.5 for chemically removing, modifying or destroying a component of normally gaseous mixture containing hazardous or toxic waste. Class 588 provides for the chemical destruction of chemical weapons, which may contain gas.

402 Pesticides, e.g., insecticides, herbicides, fungicides, nematicides (EPO/JPO):
This subclass is indented under subclass 400. Subject matter wherein the hazardous or toxic substance is intended to prevent, repel, destroy or mitigate pests. A pest is plant or animal which is detrimental to humans or human concerns, e.g. agriculture or livestock production.

(1) Note. Included in this subclass are the foreign patent documents from ECLA

(A62D 3/00M4) and FI (A62D 3/00 620).

SEE OR SEARCH CLASS:

424, Drug, Bio-Affecting and Body Treating Compositions, particularly subclasses 400 through 502 for preparations characterized by special physical form, including insect repellants, antifungal and anti-bacterial compositions.

504, Plant Protecting and Regulating Compositions, for herbicides.

403 Explosives, propellants or pyrotechnics, e.g., rocket fuel, napalm (EPO/JPO):

This subclass is indented under subclass 400. Subject matter wherein the hazardous or toxic substance is an explosive, chemical reaction propellant, e.g. for rocket or gun, or a pyrotechnic, e.g. fireworks.

(1) Note. The added material may be, for example, acids, bases, or hydrogen.

(2) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M6) and FI (A62D 3/00 630).

SEE OR SEARCH CLASS:

86, Ammunition and Explosive-Charge Making, subclass 50 for an apparatus for bomb disposal, or a method of bomb disposal by detonation. This class, 588, takes the chemical destruction of bombs other than by detonation.

110, Furnaces, subclass 237 for incinerators intended for use with explosive material.

149, Explosive and Thermic Compositions or Charges, subclass 124 for an art collection of methods reclaiming or disposing of explosive or thermic charges or component materials thereof.

431, Combustion, for processes of combustion in general, and for the combustion of hazardous or toxic waste which produces a useful product.

404 Toxic combustion residues, e.g., toxic substances contained in fly ash from waste incineration (EPO/JPO):

This subclass is indented under subclass 400. Subject matter wherein the hazardous or toxic substance is a by-product of combustion, often found in industrial and municipal fly ash. The combustion of a non-hazardous substance may result in a hazardous residue.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M8) and FI (A62D 3/00 640).

SEE OR SEARCH CLASS:

110, Furnaces, subclasses 235+ for apparatus which may be used for the incineration of hazardous or toxic waste.

431, Combustion, for processes of combustion in general, and for the combustion of hazardous or toxic waste which produces a useful product.

405 Organic substances (EPO/JPO):

This subclass is indented under subclass 400. Subject matter wherein the hazardous or toxic substance contains either two atoms of carbon bonded to each other, one atom of carbon bonded to an atom of hydrogen or halogen, or one atom of carbon bonded to at least one atom of nitrogen by a single or double bond.

(1) Note. Certain substances falling under the above definition are excluded from this and indented subclasses. Their destruction and conversion are classified in the subclasses below, to wit; hydrocyanic acid, cyanogen, isocyanic acid, cyanamide, cyanogen halides, isothiocyanic acid, fulmenic acid, and metal carbides.

(2) Note. The substance(s) that is destroyed maybe a mixture of hazardous or toxic waste with nonhazardous or nontoxic waste. Either component of the mixture being destroyed is sufficient for classification in subclass 205. Mandatory XR (cross-reference) into subclass(es) for the actual hazardous or toxic substance (component) destroyed in noted.

(3) Note. If the hazardous or toxic material is destroyed and a purified compound or composition is recovered search the appropriate compound or composition class.

(4) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M10) and FI (A62D 3/00 650).

SEE OR SEARCH CLASS:
532, Organic Compounds, for the production of useful products from hazardous or toxic waste.
585, Chemistry of Hydrocarbon Compounds, for organic hydrocarbons.

406 Containing halogen (EPO/JPO):
This subclass is indented under subclass 405. Subject matter wherein the organic substance contains fluorine, chlorine, bromine, iodine, or astatine.

(1) Note. This subclass includes hydropyrolysis and destructive stream gasification.

(2) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M10B) and FI (A62D 3/00 651).

SEE OR SEARCH CLASS:
568, Organic Compounds, for the production of halogen containing organic compounds.
570, Organic Compounds, for the production of halogen containing organic compounds.
585, Chemistry of Hydrocarbon Compounds, for process employing halogen containing compounds in the manufacture of hydrocarbons.

407 Containing heavy metals (EPO/JPO):
This subclass is indented under subclass 405. Subject matter wherein the organic substance contains a metal other than the following (light) metals – lithium (Li), sodium (Na), Potassium (K), Rubidium (Rb), Cesium (Cs), Francium (Fr), Calcium (Ca), Strontium (Sr), Barium (Ba), Beryllium (Be), Magnesium (Mg), and Aluminum (Al).

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M10D) and FI (A62D 3/00 652).

SEE OR SEARCH CLASS:
532, Organic Compounds, appropriate classes for the production of a desired metal containing organic compound.

408 Containing nitrogen or phosphorus (EPO/JPO):
This subclass is indented under subclass 405. Subject matter wherein the organic substance contains nitrogen or phosphorus.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/0010F) and FI (A62D 3/00 653).

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases, particularly subclasses 749+ for the use of chemical treatment; and subclasses 911+, an art collection, for the removal of cumulative poison from a liquid. The line between Class 210 and Class 588 is that, if there is a specific statement in the claim that hazardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is proper for Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, the process is proper for Class 210.
423, Chemistry of Inorganic Compounds, for recovering inorganic elements or compounds from organic hazardous or toxic waste.

409 Containing oxygen, sulfur, selenium or tellurium, i.e., chalcogen (EPO/JPO):
This subclass is indented under subclass 405. Subject matter wherein the organic substance contains oxygen, sulfur, selenium or tellurium.

(1) Note. Included in this subclass are the foreign patent documents from ECLA

(A62D 3/0010H) and FI (A62D 3/00 654).

SEE OR SEARCH CLASS:
423, Chemistry of Inorganic Compounds, for recovering inorganic elements or compounds from organic hazardous or toxic waste.

410 Inorganic substances (EPO/JPO):
This subclass is indented under subclass 400. Subject matter wherein the hazardous or toxic substance is not an organic substance or does not contain any component which is an organic substance.

(1) Note. The substance that is destroyed maybe a mixture of hazardous or toxic waste with nonhazardous or nontoxic waste. Either component of the mixture being destroyed is sufficient for classification here. Mandatory XR (cross-reference) into subclass(es) for the actual hazardous or toxic substance (component) destroyed is noted.

(2) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M12) and FI (A62D 3/00 660).

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases, particularly subclasses 749+ for the use of chemical treatment; and subclasses 911+, an art collection, for the removal of cumulative poison from a liquid. The line between Class 210 and Class 588 is that, if there is a specific statement in the claim that hazardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is proper for Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, the process is proper for Class 210.
423, Chemistry of Inorganic Compounds, for recovering inorganic elements or compounds from organic hazardous or toxic waste.

411 Inorganic fibers, e.g., asbestos (EPO/JPO):
This subclass is indented under subclass 410. Subject matter wherein the inorganic substance is fibrous, and made primarily from rock, clay, slag or glass.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M12B) and FI (A62D 3/00 661).

412 Containing heavy metals, in the bonded or free state (EPO/JPO):
This subclass is indented under subclass 410. Subject matter wherein the inorganic substance contains a metal other than the following (light) metals – lithium (Li), sodium (Na), Potassium (K), Rubidium (Rb), Cesium (Cs), Francium (Fr), Calcium (Ca), Strontium (Sr), Barium (Ba), Beryllium (Be), Magnesium (Mg), and Aluminum (Al).

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M12D) and FI (A62D 3/00 662).

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases, particularly subclasses 749+ for the use of chemical treatment; and subclasses 911+, an art collection, for the removal of cumulative poison from a liquid. The line between Class 210 and Class 588 is that, if there is a specific statement in the claim that hazardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is proper for Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, the process is proper for Class 210.
423, Chemistry of Inorganic Compounds, subclasses 1-209 for treating to obtain a desired metal containing compound.

413 Containing nitrogen or phosphorus (EPO/JPO):

This subclass is indented under subclass 410. Subject matter wherein the inorganic substance contains nitrogen or phosphorus.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M12F) and FI (A62D 3/00 663).

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases, particularly subclasses 749+ for the use of chemical treatment; and subclasses 911+, an art collection, for the removal of cumulative poison from a liquid. The line between Class 210 and Class 588 is that, if there is a specific statement in the claim that hazardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is proper for Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, the process is proper for Class 210.

423, Chemistry of Inorganic Compounds, subclasses 299+ for the production of phosphorus or phosphorus compounds and subclasses 351+ for the production of nitrogen or nitrogen compounds.

414 Containing oxygen, sulfur, selenium or tellurium, i.e., chalcogen (EPO/JPO):

This subclass is indented under subclass 410. Subject matter wherein the organic substance contains oxygen, sulfur, selenium or tellurium.

(1) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M12H) and FI (A62D 3/00 664).

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases, particularly subclasses 749+ for the use of chemical treatment; and subclasses 911+, an art collection, for the removal of cumulative poison from a liquid. The line between Class 210 and Class 588 is that, if there is a specific statement in the claim that hazardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is proper for Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, the process is proper for Class 210.

423, Chemistry of Inorganic Compounds, for the production of the desired inorganic substance or product, subclasses 508+ for substance or products containing selenium or tellurium, subclasses 511+ for substances or products containing sulfur, and subclasses 579+ for substances or products containing oxygen.

415 Containing halogen (EPO/JPO):

This subclass is indented under subclass 410. Subject matter wherein the inorganic substance contains fluorine, chlorine, bromine, iodine, or astatine.

(1) Note. The substance that is destroyed maybe a mixture of hazardous or toxic waste with nonhazardous or nontoxic waste. Either component of the mixture being destroyed is sufficient for classification here. Mandatory XR (cross-reference) into subclass(es) for the actual hazardous or toxic substance (component) destroyed is noted.

(2) Note. Included in this subclass are the foreign patent documents from ECLA (A62D 3/00M12K) and FI (A62D 3/00 665).

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, for processes in general for liquid purification or separation of liquid phases, particularly subclasses 749+ for the use of chemical treatment; and subclasses 911+, an art collection, for the removal of cumulative poison from a liquid. The line between Class 210 and Class 588 is that, if there is a specific statement in the claim that haz-

ardous or toxic waste is destroyed, separated, or converted into an environmentally safe substance, the process is proper for Class 588; however, if purified liquid, e.g., water, is obtained as a desired product, the process is proper for Class 210.

423, Chemistry of Inorganic Compounds, subclasses 462+ for the production of halogen or compounds containing halogen.

CROSS-REFERENCE ART COLLECTIONS

900 APPARATUS:

Apparatus used in the destruction, containment, or conversion of hazardous or toxic waste.

SEE OR SEARCH CLASS:

53, Package Making, subclasses 556+ for the apparatus used in a process for a contraction of a cover by stretching or shrinking and subclasses 580+ for the apparatus for forming or partially forming receptacle and subsequently filling.

100, Presses, appropriate subclasses for presses used in contacting hazardous and toxic waste.

110, Furnaces, subclasses 235+ for incinerators for refuse.

126, Stoves and Furnaces, subclass 452 for the process of general heating using solar heat.

175, Boring or Penetrating the Earth, subclasses 73+ for apparatus used in boring or penetrating the earth.

202, Distillation: Apparatus, for the apparatus used in the processes of distillation.

220, Receptacles, subclasses 62.11+ for multilayer barrier structure.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for apparatus acting on hazardous or toxic waste for disinfection or sterilization thereof. See subclasses 243+, particularly subclasses 292+ for treating a solid article or material with a "chemical" in a liquid, gaseous, or vapor state (e.g., steam sterilizers, steam is considered a "chemical" also when it disinfects, sterilizes, deodorizes, or preserves, since steam so used appears to have a function more than mere heating) wherein the article or material is recovered essentially unchanged from the treatment (a "chemical" is defined as a substance which has a function beyond that of another class, per se, e.g., drying, heating, cleaning, etc.; a recitation that a substance disinfects, sterilizes, deodorizes, or preserves will cause the substance to be considered a "chemical" unless accompanied by positive disclosure that the disinfecting, sterilizing, deodorizing, or preserving is done only by a function provided for elsewhere; e.g., heating, etc.), and subclasses 307+ for heat treating vessel with heating means, not elsewhere provided for.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 5 for means of encapsulating normally liquid material, subclasses 6+ for means of making particulate material directly from liquid or molten material, and subclasses 130+ for means of feeding fluent stock from plural sources to common shaping means to form composite product and the rest of the class for shaping of articles.

901 COMPOSITIONS:

Compositions used in the destruction or containment of hazardous or toxic waste.

SEE OR SEARCH CLASS:

106, Compositions: Coating or Plastic, subclasses 600+ for the production of cement using hazardous or toxic waste.

252, Compositons, subclasses 625+ for useful products (compositions) that contain radioactive hazardous toxic waste.

501, Compositions: Ceramic, for containment of hazardous or toxic waste in a ceramic.

520-528, Synthetic Resins or Natural Rubbers - Part of the Class 520 Series, for encapsulating or binding hazardous or toxic waste in a synthetic resin or natural rubber.

END